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organic acids is preceded, are mainly an inversion of the truth; since they make the capacity of saturation of hydrated acids dependent on the quantity of hydrogen in their basic water, instead of making both the quantity of water, and, of course, the quantity of hydrogen therein, depend on their capacity:—

(*s*) All that is truly said of hydrogen would be equally true of any other radical; while the language employed, would lead to the belief that there is a peculiar association between capacity of saturation, and the presence of hydrogen.

Prof. Bache drew the attention of the Society to the necessity of providing means for continuing the observations now making under the direction of the Society at the Magnetic Observatory, or of closing the Observatory: whereupon, on motion of Dr. Patterson, a special Committee was appointed, to report in regard to providing means for the continuation of the observations. Committee, Dr. Chapman, Dr. Patterson, Dr. Wood, Mr. Fraley, and Mr. Kane.

On motion of Mr. F. Peale, permission was granted to Mr. Justice, to have casts made from certain medals in the cabinet of the Society, under the direction of the Curators.

Stated Meeting, Oct. 21.

Present, thirty-nine members.

Mr. Du PONCEAU, President, in the Chair.

Letters were read:—

From Fletcher Webster, Esq. Acting Secretary of State, dated Washington, 7th Oct. 1842, announcing the transmission to the Society of a number of volumes of Public Documents:—

From the Secretary of the Imperial Society of Naturalists of Moscow, dated 13th July, 1842, announcing that the Bulletin of the Moscow Society for 1842, had been forwarded to this Society:—

From the Secretary of the Botanical Society of London, dated 1st July, 1842, and the Secretary of the Royal Geographical Society of London, dated 12th Jan. 1842, severally acknowledging the receipt of numbers of the Society's Proceedings:—and

From Mr. Jacob Snider, Jr. dated Philadelphia, 21st Oct. 1842, presenting to the Society a bust of the late John Vaughan, Esq.

On motion of Mr. Kane, it was resolved that the donation of Mr. Snider be accepted, and that the bust of Mr. Vaughan be placed as desired in Mr. Snider's letter.

The following donations were announced:—

FOR THE LIBRARY.

The United States' Almanac, or Complete Ephemeris, for the Year 1843. By John Downes. 8vo. Philadelphia.—*From the Author.*

Journal of the Franklin Institute of the State of Pennsylvania. Third Series. Vol. IV. No. 4. 8vo. Philadelphia, 1842.—*From Dr. Patterson.*

Bulletin de la Société Impériale des Naturalistes de Moscou. Vol. XV. No. 2. 8vo. Moscow, 1842.—*From the Society.*

Catalogus Coleopterorum in Sibiria Orientali a Cel. Gregorio Silide Karelin collectorum, auctore G. Fischer de Waldheim. 8vo. Moscow, 1842.—*From the Author.*

Executive Documents, Second Session, Twenty-sixth Congress. Vols. I. to VI. inclusive. 8vo. Washington, 1840–41.—*From the Department of State.*

Reports of Committees, Second Session, Twenty-sixth Congress. 8vo. 1840–41.—*From the same.*

House Journal, Second Session, Twenty-sixth Congress. 8vo. 1840–41.—*From the same.*

Index to the Executive Documents and Reports of Committees of the House of Representatives, commencing Dec. 1831, and ending March, 1839. 8vo.—*From the same.*

House Journal, First Session, Twenty-seventh Congress. 8vo. 1841.—*From the same.*

Senate Documents, Second Session, Twenty-sixth Congress. Vols. I. to V. inclusive. 8vo. 1840–41.—*From the same.*

Senate Documents, First Session, Twenty-seventh Congress. 8vo. 1841.—*From the same.*

Senate Journal, Second Session, Twenty-sixth Congress. 8vo. 1840–41.—*From the same.*

Senate Journal, First Session, Twenty-seventh Congress. 8vo. 1841.—*From the same.*

Executive Documents, and Reports of Committees, First Session, Twenty-seventh Congress. 8vo. 1841.—*From the same.*

Resolutions, Laws and Ordinances, relating to the Pay, Half-pay, Commutation of Half-pay, Bounty Lands, and other Promises made by Congress to the Officers and Soldiers of the Revolution, &c. Twenty volumes. 8vo. 1838.—*From the same.*

Report from the Secretary of the Navy, communicating a Report on the Second Invention of Thomas S. Easton, for preventing Explosions of Steam-boilers. 8vo. 1842.—*From the same.*

Transactions of the Natural History Society of Northumberland, Durham, and Newcastle upon Tyne. Vols. I. & II. 4to. Newcastle, 1831—1838.—*From the Society.*

Account of the Magnetical Observatory of Dublin, and of the Instruments and Methods of Observation employed there. By the Rev. Humphrey Lloyd, D.D. 4to. Dublin, 1842.—*From the Author.*

The Journal of the Royal Asiatic Society of Great Britain and Ireland. No. 13. 8vo. London, 1842.—*From the Society.*

Proceedings of the Geological Society of London. Vol. III. Part II. Nos. 84, 85 & 86. 8vo. London, 1841–42.—*From the Society.*

Poësies Choisies de Jean-Simon Chaudron, suivies de l'Oraison Funèbre de Washington, par le même Auteur. 8vo. Paris, 1841. *From Mr. Du Ponceau.*

The paper, entitled "Extracts from a Mathematical Common Place Book," read at the last meeting, was, with the consent of the Society, withdrawn by the author.

Mr. Lea read a continuation of his paper on new fresh water and land shells, which was referred to a Committee.

This paper contains the following species:—

Unio Foremanianus. Testâ triangulari, compressâ, inæquilaterali, posticè angulatâ, ad latera planulatâ; valvulis crassis; natibus prominentibus; epidermide luteâ, valdè radiatâ; dentibus cardinalibus crassis; lateralibus crassis rectisque; margaritâ albâ. *Hab.* Coosa River, Ala.—*Dr. Brumby.*

Unio Haleianus. Testâ ellipticâ, subinflatâ, inæquilaterali; valvulis subtenuibus; natibus prominulis, ad apicem undulatâ; epidermide tenebroso-fuscâ, striatâ; dentibus cardinalibus magnis, compressis; lateralibus longis subcurvisque; margaritâ albâ et iridescente. *Hab.* Mississippi River, 30 miles above New Orleans. *Josiah Hale, M.D.*

Unio Dariensis. **Testâ oblongâ, subinflatâ, inæquilaterali, posticè perangulatâ, ad latera planulatâ, valvulis subcrassis, natibus prominulis; epidermide luteo-fuscâ; dentibus cardinalibus compressis; lateralibus longissimis lamellatisque; margaritâ albâ. *Hab.* Near Darien, Georgia. *J. H. Couper, Esq.***

Anodonta Dunlapiana. **Testâ ellipticâ, inflatâ, subcylindraceâ, transversè vittatâ; valvulis tenuibus; natibus prominulis, undulatis; epidermide nitidâ, luteolâ, obsolete radiatâ; margaritâ albâ et iridescente. *Hab.* South Carolina.—*Mrs. Dunlap.***

Dr. Hare laid on the table some copies of an essay published in Silliman's Journal for July, entitled "Additional Objections to Redfield's Theory of Storms," for the use of such members as might take an interest in meteorological discussions.

In addition to the errors previously enumerated as existing in the opinions and allegations, advanced in favour of that hypothesis, he had, in the essay now submitted, adverted to the following:—

Attributing winds to the rotary or orbitual motion of the earth, when by those forces no corresponding currents are produced in the ocean.

Alleging that, by a conflict with an island, or concentration by cliffs, a trade wind could be so accelerated and deflected, as to whirl with the fury of a hurricane.

Supposing that, if a whirlwind could be so induced, it could endure and could even receive an accession of force from a conflict with extraneous bodies; when, owing to the centrifugal force consequent to the gyration, the momentum must be rapidly communicated to the surrounding fluid, and thus be dissipated in a quantity of matter, increasing with the square of the distance from the centre.

The inconsistency of the characteristics of whirlwind storms, as made out by certain alleged "*reliable facts and observations*," of Mr. Redfield; such storms being represented as heaping up the air on the border of the centrifugal force, while, at the same time, carrying it, and other bodies, towards the centre, to be discharged at "*one extremity of the axis of rotation.*"

The contradiction in representing the barometric column as sinking when first exposed to the advanced portion of a whirlwind, and rising when under the rear portion; when it is admitted that, by the centrifugal force, an aërial accumulation must take place on all sides towards the border.

The inconsistency of representing the diameter of the most violent zone in storms, as usually much exceeding a hundred miles, the storm advancing twenty-seven miles per hour; and yet that an observer, over whom the centre should pass, after exposure to the greatest violence of the whirl on one side, could be ***suddenly*** exposed to an equally violent but contrary wind on the opposite side.

The discordancy of the whirlwind theory (agreeably to which a storm, travelling towards the ***north-west*** and ***whirling*** to the ***left,*** must have its greatest velocity in a south-easter on the north-eastern limb, where the tangential velocity coincides with the progressive motion), with the fact stated by Edwards, and admitted by Redfield, that on the limb alluded to, in the storms alleged so to move, there is the least violence.

The obvious consequence, that if our north-eastern gales be due to a whirlwind, moving along the coast of the United States at the rate of twenty-seven miles nearly per hour, whirling to the left, the gyratory velocity on the south-eastern limb must be more than fifty miles per hour greater than on the north-western limb; so that a much more violent gale from the south-west, at sea, must be simultaneous with the prevalence of every north-eastern gale along the coast; all of which is contrary to experience.

The palpable inconsistency of representing tornadoes as generated by the conflict of winds, arising from the earth's motion, with islands, and yet as ensuing in a calm, where there are no active currents to meet each other.*

To this list of errors, the following, since detected, might be subjoined:—

In opposition to the "*long cherished theory of calorific rarefaction*," entertained by the modern meteorological school, Mr. Redfield ascribes all winds to a rotative movement, arising from rotary or orbitual motion of the earth, and conflicts between trade winds and islands, and yet denies that he has advanced any theory of storms upon assumed scientific principles.

He repeats that the general winds would be more uniform, brisk, and constant, than at present, were the temperature uniform all over the globe, and yet denies that he represents the agency of heat as *unnecessary* to the existence of winds.

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* If tornadoes originate in calms, where there are "*no currents to meet each other*," and if they be attended by vertical currents about the axis, this must of necessity be productive of centripetal currents, which will probably gyrate from their obliquity. But what other cause can be productive of the upward current under such circumstances, if it be not an inferior pressure over a central space?

Redfield's account of whirlwinds excited by fire demonstrates, that a cause producing an upward current in the atmosphere, may, under favourable circumstances, be productive of tornadoes and concomitant electrical discharges. See Silliman's Journal, for 1839, Vol. XXXVI. page 50.

As if affording support to his hypothesis, he continues his effort to show that there has been gyration during certain tornadoes, after it has been demonstrated that such gyration, being attended, *as he has admitted*, by an upward current about the axis, and an acceleration of velocity towards the centre of motion, is irreconcilable with whirlwinds arising from the causes to which he has referred, and *which have been inconsistently admitted by him to be productive of a centrifugal force, determining the air towards the circumference.*

Founding an accusation of error, upon a mistake of his own, in alleging that, when a storm travels from south-west to north-east, whirling to the left, the progressive motion will not conspire with that of the whirl on the south-eastern limb, so as to be productive of a south-wester of pre-eminent fury: whence this inference, that Mr. Redfield cannot perceive one of the most palpable and inevitable consequences of his own doctrine, even after it has been pointed out to him.*

Subsequently to the preparation of his second essay respecting the errors of Redfield, Dr. Hare had found, in Dove's essay on the law of storms, other errors, of which he would now give a sketch.

Treating it as sufficient to show a cause of gyration in a wind blowing towards the equator, without assigning any cause for the peculiar violence of the wind, which, being thus made to whirl, is converted from a moderate trade wind into a furious hurricane.

Not perceiving that whatever bends the wind from a straight course, must cause a loss of some portion of its velocity; so that gyration must have the inverse effect of contributing to the unexplained accession of violence which accompanies the transformation alluded to: and further, that a travelling storm, as every whirlwind is represented to be, cannot be sustained unless the causes of violence travel with it; since any momentum, *locally* acquired, must soon be expended; and the more rapidly, on account of the centrifugal force causing a collision with inert portions of the atmosphere beyond the zone, at which the generating forces may have been applied.

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* Agreeably to the observations collected by Loomis, the storms, in which the well known sudden change from south-west to north-west occurs, travel from north-west to south-east. But a change from the latter to the former direction can only take place in a whirlwind in travelling from south-west to north-east. Besides, as such storms have to cross the Alleghany mountains, is it not inconceivable that they should whirl? See Transactions, A. P. S. Vol. VII.

Can any mass of air be imagined to rotate, while a range of mountains is so situated as to cut it nearly in twain?

The centripetal theory assumes that an ascending column about the centre of a storm, causes an afflux of wind from opposite quarters. Professor Dove alleges that such winds must neutralize each other, their intensity lessening more and more, as they approach their place of meeting. This shows that he does not understand the theory which he has undertaken to refute; since it must be quite evident, that, in rushing towards an ascending column, the velocity must become greater as the space within which the affluent air has to move becomes less.

It is also inferred by this negligent reasoner, that the sudden change of wind from one direction to another directly opposite, for which hurricanes are notorious, and in proof of which he adduces additional evidence, is inconsistent with the centripetal theory, upon the erroneous inference above noticed; when this suddenness of change has been shown to be irreconcilable with the idea that hurricanes are whirlwinds. In that case the wind would blow comparatively with little force within a large central area, which, at the rate of travelling admitted by him, would require several hours to pass over an observer, so situated as to be successively exposed to opposite winds.

That an upward current, having a base of 10,000 feet, or two miles nearly, would require more wind to supply it (if of equal velocity) than 400 of the largest tornadoes ever known to take place in the United States. It was believed that no tornado had been observed to have a focal area over 500 feet,* which would be only one-twentieth of the diameter above assumed, and of course the areas would be as 400 to 1.

According to Professor Dove, storms travel at the rate of thirty miles an hour. At this rate a focal area of 10,000 feet would require less than two minutes to pass over an observer, so as to subject him to winds blowing directly opposite to each other.

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* The space within which the water rose, during the passage of a tornado over the river near Providence, in August 1838, was estimated by Mr. Allen at 300 feet. Of course, a focal area of 500 feet would have been productive of a tornado nearly three times as large; or as the square of 5 to that of 3, or as 25 to 9. See Silliman's Journal for 1840, Vol. XXXVIII. p. 77, or Transactions, A. P. S. Vol. VI.

It is taken for granted that the space, within which the water rose, was the focal area, or base of the ascending column.

Dr. Hare had prepared a communication for the American Journal of Science, in which he hoped to justify his summary statement of Dove's errors.

Prof. Henry communicated, orally, an extension of the experiments, which he had previously brought before the Society, on electro-dynamic induction. He had succeeded in magnetizing needles by the secondary current in a wire more than two hundred and twenty feet distant from the wire through which the primary current was passing, excited by a single spark from an electrical machine.

Mr. Lea called the attention of the Society to two specimens of coal, taken from the large anthracite coal bed in the Pine Grove district.

One of the specimens was remarkable for its regular rhombic form, in which all the angles were 70° and 110°, the cleavage of each plane being nearly perfect. The other was part of a large specimen of carbon, scarcely changed from its condition as charcoal, the loose fibrous structure being nearly perfect, and the whole having very thin laminæ of pure anthracite, parallel with the fibre.

A portion only (2 or 3 feet) of this large bed, the dip of which is about 35°, presented the oblique cleavage, preserving that character throughout as far as could be observed.

Mr. Lea then made some observations on the disturbed condition of the whole of the southern coal field, and read a portion of a letter from the Athenæum, addressed by Mr. Lyell to Dr. Fitton, where he states that the conversion from the bituminous to the anthracite condition is " most complete where the beds have been most disturbed."

Mr. Lea did not think this was the case throughout this coal field; for Mr. Lyell seemed to have overlooked the fact, as shown in the sections of Mr. Taylor's reports on that part which passes through the county of Dauphin, and known generally to our geologists, that this, like the coal field of South Wales, insensibly graduates into bituminous coal. Such is the fact as we proceed westward in the southern coal field of Pennsylvania, the bitumen being yielded up in the more eastern part, as stated by Mr. Taylor, Prof. Silliman, and other geologists.

It is well known that the conglomerates and coal beds of Sharp Mountain (the southern border of this coal field) are nearly vertical at Tamaqua, Pottsville, Pinegrove, Goldmine Gap, Rauch Gap, Yellow Spring Gap, and Rattling Run Gap; but there is a great difference in the debituminization in these different districts; the eastern group varying from 5 to 7 per cent. in the proportion of volatile matter, while the western group has a much larger proportion, and varies from 9 to 17 per cent., differing but 1 or 2 per cent. from that of Blossburg, Queen's Run, Ralston and Cumberland, Md.; all these being on the eastern part of the great western coal field.

The attention of the Society having been called by the Librarian to the state of the manuscripts in the Library, it was, on motion of Mr. Kane, resolved that a Committee be appointed to consider the present condition of the manuscripts in the possession or custody of the Society, and that they report whether any and what action may be proper for their secure preservation, and for facilitating their usefulness. Committee, Mr. Ord, Mr. Kane and Mr. Frazer.

The following gentlemen were elected members of the Society:—

Rev. GEORGE PEACOCK, F.R.S., of Cambridge, England.
J. I. CLARK HARE, Esq., of Philadelphia.
Prof. BENJAMIN PEIRCE, of Harvard University.